Energy Efficiency and Demand Management in Planning Electric Vehicle Technologies
California’s GHG Emissions

- Transportation: 37%
- Industrial: 23%
- Electricity Generation (In State): 11%
- Electricity Generation (Imports): 9%
- Agriculture: 8%
- Residential: 7%
- Commercial: 5%
- Not Specified: <1%
GHG Emissions from Conventional Light Duty Vehicles vs PEVs

Emissions (grams CO2-eq / mile)

- Gasoline/Petroleum
- PEV

- Upstream
- Tailpipe
Cars are now residential & commercial plug loads
Charging a 2015 Volt at home:

Typical Household

Typical Household + EV

kWh per month

0

200

400

600

800

1000

1200
• **Joseph Oldam, CALSTART** (12 min)
  – Central Valley Energy Tune-Up Program

• **Raef Porter, SACOG** (12 min)
  – DC Fast Charge Installation Pilot

• **Matthew Marshall, RCEA** (12 min)
  – Regional infrastructure planning and deployment

• **Rick Teebay, LA County ISD** (12 min)
  – Low-carbon Fuel Standard Credits, ADA guidelines

• **Q&A / Panel Discussion** (29 min)
Rural, Regional Public Infrastructure Deployment
• Regional planning
• Challenges
• Strategies
Charging Infrastructure Plan

• Created agent-based simulation model
• Sited chargers to minimize delay of simulated drivers

- Public Charging Event
- Private Charging Event
- Driver Delay Due to Unavailable Charger
Micro-siting Analysis
Preliminary plans for high-priority sites
Impact on Peak Humboldt Demand of PEV Charging at 2% Penetration

- **Remaining Circuit Capacity**
- **Added Peak from Charging**
- **Existing Peak**

Power (MW)

Distribution Circuit Name and Feeder Number
Regional Infrastructure Needs

• Around 60 public sites needed to support ~3,000 vehicles (2% penetration)
• Strategic corridor locations for fast charging can be tricky
Rural Infrastructure Challenges

• ADA
• Copper theft
• Cellular network coverage
• Panel capacity on older structures
Usage impacts on site load
Last Thursday at RCEA
Last Thursday at RCEA

Lunch-time level 2
6.6 kW charging event
Last Thursday at RCEA

Lunch-time DCFC
50 kW charging event*

*For illustration purposes;
DCFC not actually feasible at site
Publicly-owned Charging Network Business Model

- RCEA owns and operate the charging network
- MOUs with carefully-chosen site hosts
- Chargers sited to reduce range anxiety, not just generate revenues
- Economy of scale for operation, maintenance, and administrative costs
- Separate meters when possible
High costs and lower usage = early-stage business case is shaky.
Humboldt County electric vehicle sales
Share of new vehicle sales

Share of new vehicles

US average: 0.8%

ZEV 2016 goal: 2.3%

Battery electric vehicle
Plug-in hybrid electric vehicle
Humboldt is #3 in the United States

Share of new vehicle sales
Thank You